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ABSTRACT

By the year 2000, most new entrants to the work force will be women, minorities, or immigrants who have not mastered the skills necessary for the entry-level jobs of the future--the ability to conceptualize, analyze, and communicate well. However, research has demonstrated that these people, who are at risk of chronic unemployment, do not perform well in traditional education because classroom lessons are not connected to the work world. Job training programs funded by the Job Training Partnership Act (JTPA) focus their services on such people, and the JTPA youth remediation programs are especially appropriate for preparing tomorrow's work force. Since 1986, criterion-referenced tests have been used to determine who is at risk because of work-related skill deficiencies; 6 states and 43 service delivery areas (SDAs) of JTPA have participated in the demonstration program. Currently, several SDAs are working on a workplace-related assessment and remediation design that uses three levels of employability: preemployable, nearly employable, or employable. JTPA clients are placed into one of these levels based on assessment results and then are provided with the specific services designed to meet the needs of that level. The result of the project will be the development of three or four workplace-related assessment systems from which SDAs across the country can choose based on the needs of their labor market. Recommendations were made to determine eligibility levels and functional skills based on the local job market. (An appendix provides information on the Comprehensive Adult Student Assessment System, on which the assessment tools will be based.) (KC)

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IMPROVING WORKPLACE SKILLS: LESSONS FROM JTPA

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IMPROVING WORKPLACE SKILLS: LESSONS FROM JTPA

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The Center for Remediation Design is supported by the U.S. Conference of Mayors, the National Association of Counties, the National Alliance of Business, the National Association of Private Industry Councils, and the National Job Training Partnership. The National Governor's Association supports the Center specifically to carry out the work discussed in this paper. The views expressed are those of the authors and do not represent official positions of any of the five individual organizational sponsors.

The Comprehensive Adult Student Assessment System (CASAS) is a comprehensive curriculum management and assessment system that has been validated by the Joint Dissemination Review Panel (JDRP) and is approved as an exemplary program for national dissemination through the U.S. Department of Education National Diffusion Network.

EXECUTIVE SUMMARY

By the year 2000 most new entrants to the workforce will be women, minorities or immigrants. At the same time, an increasing percentage of entry level jobs will require the ability to conceptualize, analyze and communicate well. However, many of the women, minorities and immigrants who will constitute the majority of new workers have not mastered the skills necessary to compete in the workforce. Research has demonstrated that these people, who are at risk of chonic unemployment, do not perform well in traditional education settings, primarily because the lessons learned in the classroom are not connected to the practical needs of the work world.

Job training programs funded by the Job Training Partnership Act focus their services on the people who are at risk of chronic unemployment. The JTPA youth remediation programs are especially appropriate vehicles for preparing tomorrow's work force for the workplace.

In 1986 the Center for Remediation Design (CRD) initiated a demonstration project, in cooperation with the Comprehensive Adult Student Assessment System, to develop an assessment strategy for the JTPA system that would utilize criterion-referenced tests to define and identify at risk people on the basis of skill deficiencies specifically related to the workplace and, consequently, pinpoint the specific job-related remediation needs of every person undergoing the assessment. Workplace-related, criterion referenced tests indicate how well an individual performs relative to job performance criteria. To date, six states and 43 SDAs within those states have participated in the demonstration.

Currently, several of the 43 SDAs are working on a workplace-related assessment and remediation design that utilizes three different levels of employability: 1) pre-employable; 2) nearly employable; or, 3) employable. JTPA clients are placed into one of these three levels of employability,

based on assessment results, and then provided the specific services designed to meet the needs of that specific level. Until this strategy was developed, clients were either deemed employable or not, and no discrete distinctions were made between those with high deficiencies and those who, with less assistance, could be placed into jobs.

It now appears that the end results of the Project will be the development of three or four workplace-related assessment systems that SDAs across the country can choose from, based on the needs of their local labor market. If the JTPA system as a whole uses such criterion-based reference tools, aggregate data at the national level will be more comprehensive than the mish mash of data that exists today.

As a result of the demonstration project, the recommendations below are offered for consideration.

- Employability should be defined in terms of basic education skills and work maturity deficiency levels, rather than just on the acquisition of the high school diploma.
- Any revisions to eligibility criteria for JTPA, while maintaining the current focus on the economically disadvantaged, should target on the basis of deficiencies in workskills and functional basic academic skills.
- Policy should direct the use of criterion-referenced (or competency-based) strategies to assess for basic skill deficiencies.
- JTPA youth employment competency systems should be required to provide a combination of training programs to ensure that the concept of "employment competent" includes at least a locally acceptable snapshot of employment-related basic skills.
- These strategies should be considered in the development of assessment strategies under the Economic Dislocation and Worker Adjustment Assistance Act, the Family Support Act of 1988, and the Carl Perkins Vocational Education Act, at the very least.

INTRODUCTION

In 1986 the Congress of the United States mandated that youth programs funded under Title IIB of the Job Training Partnership Act (JTPA) include a basic skills remediation component. In response to that mandate, JTPA practitioners and policy makers defined their role as relating remediation activities to the workplace. However, the tools and strategies to do this were not available to any great extent. Consequently, since the enactment of the remediation mandate, the JTPA system has relied heavily on the assessment tools and teaching strategies developed by the traditional education system, despite the fact that many youths served by JTPA have not benefitted from traditional education techniques.

In 1986 the Center for Remediation Design (CRD) initiated a project to identify the reasons that certain youth do not fare well in the traditional school system and to determine what can be done to provide such youth with the basic literacy skills they need to enhance their employability. This paper summarizes the results of the project and discusses implications for the job training and the education systems.

Our education system is faced with the challenge of producing young adults who are able to handle the increasing educational demands of tomorrow's jobs.

RELATING BASIC SKILLS TRAINING TO THE WORK WORLD

Today it is common knowledge that the nature of the workforce and the demands of the work world are changing. By the year 2000, in just over a decade, most new entrants to the workforce will be women, minorities or immigrants. At the same time, an increasing percentage of entry level jobs will require the ability to conceptualize, analyze and communicate well.

Our education system is faced with the challenge of producing young adults who are able to handle the increasing educational demands of tomorrow's jobs. This challenge is made more difficult by the fact that many of the women, minorities and immigrants who will constitute the majority of new workers have not been able to master the skills necessary to compete in the workforce, even when they participate in the traditional education system. Such people are considered to be at risk of chronic unemployment. Consequently, employers are often faced with the necessity of providing new workers with basic skills remediation. Productivity and the economy are suffering.

There is a gap between traditional basic skills instruction and the expressed labor force skill needs of employers. Jackie Resnick, a researcher at the University of Pennsylvania, eloquently summed up the differences between school-based and employment-based learning by saying that "School focuses learning on individual cognition not cooperation; schools stress pure thought not use of tool aided learning; schools emphasize the manipulation of abstract symbols, not of objects and events; and school learning is generalized rather than situation specific learning required for on the job competency."

Students—as well as the eduation system itself—must be made to see the direct correlation between what is taught in school and performance on the job.

In recent years educators and job training professionals have begun to think about how to provide a context for learning by linking workplace skills to basic skills training. This type of instruction can benefit not only at risk youth, but all youth.

John Bishop, in his study, *Why High School Students Learn So Little and What Can Be Done About It*, states that poor performance in basic skills is the result of a lack of motivation and apathy on the part of at risk students and their parents.[1] This lack of motivation is the product of three factors:

1. the way in which schools recognize and reinforce student achievement;
2. the failure of the labor market to reward high school achievement; and,
3. peer group pressure.

Students—as well as the education system itself—must be made to see the direct correlation between what is taught in school and performance on the job. This is most important for workers entering the labor market directly out of high school. The labor market initially places more emphasis on obtaining a degree than on developing skills. And yet, cognitive skills improve productivity by helping the worker learn new skills more quickly.

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1. Bishop, John H., *Why High School Students Learn So Little and What Can Be Done About It*, Center for Advanced Human Resource Studies, New York State School of Industrial and Labor Relations, Ithaca, New York. (Presented at the hearings conducted by the Subcommittee on Education and Health of the Joint Economic Committee on "Competitiveness and the Quality of the American Workforce," October 1, 1987.)

Berryman defines at risk youth as those who don't do well in a traditional learning environment, either because they don't want to or because they don't see a need to.

Student achievement should be defined as competency gains in skills that are linked to employability and jobs. The ability to identify a clear connection between school and work will motivate many students. If our teachers and employers are encouraged to interact, the ultimate result will improve community life and positively influence the standard of living.

THE HIGH RISK YOUTH

In addition to relating basic education to the workplace, the job training and education systems must address the specific needs of at risk youth. But who is at risk and how is the term at risk defined? For the most part, at risk youth have been defined by demographics and stereotype. Susan Berryman in *Breaking Out of the Cycle: Rethinking Our Assumptions About Education and the Economy*, questions these definitions.[2] Berryman defines at risk youth as those who don't do well in a traditional learning environment either because they don't want to or because they don't see a need to. Their behavior is based on how they see themselves in our society, especially as our society is reflected in an education system that is geared toward preparing students for jobs that are highly academic in nature and that values thought independently of practical applicability.

At risk students cannot or do not see themselves as working in this type of environment. Therefore, school and

2. Berryman, Sue E., Dr. *Breaking Out of the Cycle: Rethinking Our Assumptions About Education and the Economy*. Occasional Paper No. 2. National Center on Education and Employment. Teachers College, Columbia University. New York, New York.

The fact that these youths are considered to be at risk is a reflection of the way they see themselves in our society and a product of the fact that they are not encouraged to recognize the connection between education and employment.

instruction become unimportant to them. They lack the motivation to learn. The fact that these youths are considered to be at risk is not so much the result of their economic or demographic background as it is a reflection of the way they see themselves in our society and a product of the fact that they have not been encouraged to recognize the connection between education and employment.

Berryman also states that students who do well in school have a greater ability to adapt to specific situational (on the worksite) changes. If instruction focuses more on the application of functional ability to work, at risk students will see the correlation between school and work and will be motivated to develop their basic skills.

Sticht, Armstrong, Hickey and Caylor address this issue in *Cast-Off Youth: Policy and Training Methods From the Military Experience*.[3] The authors discuss their study of Project 100,000, a program in which the military accepted up to 100,000 youth who were previously excluded from service because of their low aptitude test scores. One of the major findings of this study was that remedial programs directly related to the life experiences of participants while in the military, i.e., instruction developed from the functional needs of military life, as opposed to general literacy instruction, had the most significant results.

Project 100,000 managers used an operational approach that included limited assignments, extra time and help, course revision and modifications, and remedial literacy training. The managers designed their instruction methods to reflect five major principles:

3. Sticht, Armstrong, Hickey and Caylor, *Cast-Off Youth: Policy and Training Methods from the Military Experience*, Prager Publishers, New York, New York (copyright 1987 by Applied Behavioral and Cognitive Sciences, Inc.)

The target groups served by JTPA include many people who are at risk of chronic unemployment and who, by the year 2000, will comprise a majority of new entrants to the workforce.

1. initial instruction should be related to what the participant already knows;
2. literacy training should be integrated with technical training;
3. probable areas of learning difficulty should be identified and revised;
4. learning situations and methods should be related to specific military situations; and,
5. specific course objectives should be designed so that they are job related.

The authors of *Cast-Off Youth* made four recommendations:

1. let students know how what they are learning relates to the purpose of their training;
2. develop new knowledge based on what one already knows;
3. design lessons that build on prior knowledge; and,
4. integrate basic skills into the technical or academic content so that students can build competency to transfer basic skills to other settings.

JTPA, REMEDIATION AND THE WORKPLACE

In 1983 the Congress of the United States created the Job Training Partnership Act (JTPA), the latest in a series of programs going back to the Manpower Development Training Act of 1962. While the specific rules have changed from program to program, the primary purpose has always been the same: to provide poor people and minorities with practical skills that will increase their employability. The target groups served by JTPA include many people who are at risk of chronic unemployment and who, by the year 2000, will comprise a majority of new entrants to the workforce.

The challenge for the private industry councils was to find a way to relate their mandated remediation programs to the workplace.

In 1986 Congress amended Title IIB of JTPA by mandating that every Service Delivery Area (SDA) provide remediation as a component of its youth programs (Title IIB). The challenge for the Private Industry Councils (PICs) that provide leadership in the JTPA Service Delivery Areas was to find a way to relate their mandated remediation programs to the workplace. As stated at the beginning of this paper, while JTPA practitioners and policy makers were aware of the necessity to develop workplace literacy, the tools and strategies to do so were not available to any great extent.

Under JTPA the development of employment competency systems has become a key strategy in service delivery to youth. Private Industry Councils have struggled to expand and improve assessment methods for determining basic skills levels of youth entering the system. At the same time, service providers have tried to identify the best remediation strategies to prepare youth for work, while meeting the needs of local employers. JTPA practitioners are in the unique position of working both with the remediation providers and with local businesses and can ensure the most appropriate services to youth in need.

In 1986 five public interest groups established the Center for Remediation Design (CRD) as a technical assistance, training and research center to help employment and training providers define their role in connecting workplace skills to basic academic skills.[4] Since its inception, CRD has researched the nature of basic skills deficiency and its effect on productivity, through on-site case study work in over 60 service delivery areas.

4. The U.S. Conference of Mayors, the National Association of Counties, the National Association of Private Industry Councils, the National Alliance of Business and the National Job Training Partnership, Inc.

At risk people should be defined and identified on the basis of skill deficiencies that are specifically related to the workplace.

That research has included efforts to determine why at risk youth do not fare well in the traditional school system and to determine what can be done to enhance their employability skills. As a result of that research, CRD has reached many conclusions. Three are especially relevant to this discussion:

1. remediation services provided through JTPA should not mirror traditional education;
2. basic education should be considered as training when the labor market demands these skills; and,
3. assessment strategies which integrate work-related basic skills have to be developed and implemented if labor market needs are to be met.

These conclusions, supported by the work of Sticht, Bishop and Berryman, led to the implementation of a demonstration project which is currently ongoing through the Center for Remediation Design.

PROJECT OF THE STATES

The purpose of this demonstration project, called the Project of the States, is to develop an assessment strategy for the JTPA system that identifies people who are at risk of chronic unemployment. Such a strategy, by its very nature, means that assessment criteria must be related to workplace skills. It also means that at risk people should be defined and identified on the basis of skill deficiencies that are specifically related to the workplace.

Such an assessment strategy utilizes criterion-referenced standardized tests, as opposed to norm-referenced, standardized tests. Both criterion-referenced and norm-referenced standardized assessment tests provide scores that allow comparisons between individuals, schools, labor market areas,

A workplace related, criterion-referenced assessment strategy utilizes criteria that reflect the basic educational skills necessary for success on the job.

states and nations. However, standardized criterion-referenced assessment tests indicate how well an individual performs relative to some criterion or specific learning objective, rather than how well he or she performs relative to others, as is the case with norm-referenced tests. Standardized criterion-based assessment connects what is taught to what is tested.

A workplace related criterion-referenced assessment strategy utilizes criteria that reflect the basic educational skills necessary for success on the job. The development of such a criterion-referenced assessment system would help to eliminate the current mismatch between assessment, processes and services and would put basic skills education one step closer to the job world.

Since workplace-related, criterion-referenced assessment strategies assess specific education skills in real life situations, they tie in well to remediation, because they enable educators to identify where on a continuum of specific skills an individual is placed. The student moves from one competency to the next. If he or she has not mastered a specific concept, particular remediation approaches can be used to help. Competency-based tests, although limited to reading, math and listening related skills, are beneficial to the employment and training system because they are based on practical achievements considered by employers to be significant and meaningful.

Ultimately the Project of the States hopes to create a systemic approach that matches services provided by the JTPA system with what the at risk person needs to become employable. Workplace related, criterion-referenced assessment, in such a systemic approach, should be based on the

To develop a criterion-referenced assessment system for use by the JTPA system, the Project of the States had to focus on those basic skills needed by the "generic worker."

three skill realms which define employability: workskills, functional basic academic skills, and attitude skills.

The services provided must address each of the three realms. However, the early stages of the Project of the States have focused on functional basic skills assessment because it was most in need of revision. Pre-employment/work maturity and some attitude skills as they relate to the world of work are currently being addressed by the JTPA system.

To develop a criterion-referenced assessment system for use by the JTPA system, the Project of the States had to focus on those basic skills needed by the "generic worker," i.e., the skills needed by all entry level workers which are similar across various industries but within a specific job market. The original goal was to get five to seven SDAs in each of five to ten states to participate in a project to develop locally based workplace related assessment strategies. Currently, six states with a total of 43 SDAs are participating in the demonstration and support the implementation of the concept. These states are Michigan, Oregon, Nebraska, Kansas, Washington and Connecticut. Connecticut participates under the supervision of Susan Curnan at the Brandeis Center for Human Resources.

Michigan has become the "showpiece" of the demonstration. The state provides an excellent example of how a criterion-referenced assessment system can work. After 18 months of development, the system provides a process that matches basic skills to work skills and to participant needs.

To assist in the development of a criterion-referenced system, the Center for Remediation Design analyzed existing employer survey data, conducted employer surveys, and

Once generic functional skills were identified, the next step was to secure tools for assessing individual client mastery of skills.

conducted employer validations. In addition, the state of Michigan Governor's Task Force conducted a survey in 1987 of 1,400 local businesses; each of the other states surveyed at least 50 employers.

Surveyed employers were given a list of skills and asked to identify whether or not each skill was important to their labor needs. For example, employers were asked which of their employees used math skills and how they used them, which of their employees used reading skills and how they used them, and what types of materials their employees read on the job. The information gleaned from these surveys was used to identify a series of functional basic skills used by the generic entry level employee.

Such generic skills can be refined by adding detailed requirements of a specific job. For example, employers identified the ability to read a chart, list, or graph as important. The use of this ability varied with the job. In one instance, a clerk in a market might use this ability to identify the price per pound of a specific item. A different employer might require an employee to read a blueprint. The basic knowledge requirement for each (the generic entry level skill) was the same across the board. Only its application differed.

Once generic functional skills were identified, the next step was to secure tools for assessing individual client mastery of such skills. Such assessment tools currently being used in the Project are based on the Employability Competency System (ECS), developed by the Comprehensive Adult Student Assessment System (CASAS), San Diego Community College District Foundation. The use of the CASAS system eliminated the need to identify and validate individual test items, *since CASAS had already done so.*

Assessment tools currently being used by the project are based on the Employability Competency System developed by the Comprehensive Adult Student Assessment System (CASAS).

CASAS is a comprehensive assessment and curriculum management system. It was designed specifically for adult and alternative education groups and has been nationally validated. CASAS provides assessment which is linked to competencies and relevant competency-based curriculum materials that are appropriate for Basic Adult Education and English-as-a-Second-Language programs. CASAS provides a curriculum management system for programs, with an underlying measurement scale that ranges from preliterate through high school level. This system provides day-to-day instructional direction, more general curriculum planning and ongoing assessment linkage.

The system, which is ten years old, has identified 34 competency areas and has been linked to vocational skills competencies. CASAS uses an employability competency system appraisal for identification of basic reading and math functional skills levels in an employability context. The achievement tests measure reading, math and listening comprehension as a client progresses through the program. The assessment design includes a bank of over 4,000 criterion-referenced items that have been extensively field tested throughout California and other states over an eight year period. Each item is designed to measure a specific competency statement along a continuum of difficulty.

The CASAS assessment for reading, math and listening skills is based on individually calibrated test items. An understanding of the CASAS Item Bank helps explain the way tests are constructed and how they are scored. All CASAS tests are constructed from the items in the Item Bank. All items, developed by specially trained item writers, measure a particular competency statement from the competency list and have an established difficulty level based on extensive field testing and analysis.

It appears that basic skills needed for entry level employment are anchored in the state labor market and are not necessarily the same from one state to another.

The model used in developing the item bank is based on item response theory. This model, evaluated in *Psychometric Background and Measurement Issues Related to the Development of CASAS*, by Rickard, Stiles and Martois (see Appendix A), specifies the relationship between observable test performance and unobservable trait or ability assumed to underlie performance on the test. The probability of success on an item depends on certain item parameters and an examinee's ability. In an item bank, all items are placed on a common scale and each item has a desired parameter. The initial pool of items was developed by field personnel considered to be experts in adult basic education. All items were matched to specific competency statement objectives within the life skills areas of consumer economics, community resources, health, occupational knowledge, and government and law.

The CASAS test construction and scoring process are appropriate for competency-based youth, adult and alternative education programs where the focus is shifted from traditional grade and seat-time based definition to a focus on functional literacy.

CASAS and the Center are conducting an item by item analysis on those sets of skills identified in each state and matching them to test items that will test for the functional skills identified and validated by the local labor community. In general, across all states involved in the demonstration, CASAS has already developed 85-90% of all test items identified by local employers. Preliminary survey findings indicate that there is more similarity than dissimilarity across labor markets within a state on how basic skills are used across entry level jobs. However, it appears at this preliminary stage that basic skills needed for entry level employment are anchored in

Each of the SDAs involved is working on implementing this strategy, no longer defining people on the basis of who they are but by their specific skill level in getting and keeping a job.

the state labor market and are not necessarily the same from one state to another. The knowledge that these competencies are more or less equal across SDAs within a state can allow for the development of a series of assessment systems that can be used by more than one SDA based on a comparison of local market needs.

The next phase of the project is to implement program strategies. Each of the SDAs involved is working on an implementation strategy, no longer defining people on the basis of who they are but by their specific skill level in relation to getting and keeping a job.

The competencies and assessment tools developed from this project will be put into a program design that has three tiers, each tier representing a different level of employability: 1) pre-employable; 2) nearly employable; or, 3) employable. Each tier is based on what level of work skills and basic skills a client has. Most traditional tests like TABE or ABLE lack the connection to the specific needs of the local market. With the use of a criterion-referenced set of tools it is possible to identify what a person knows how to do within each tier and then provide specific training for each level of the system.

Each JTPA client undergoes an appraisal and/or diagnostic assessment and is placed into the appropriate tier. Once placed into a tier, clients are then provided the services needed to enable them to move from one level of employability to another. Participants are monitored and assessed to determine their mastery of specific competencies. The final step is certification of proficiency.

Until this point, clients were either employable or not, and no discrete distinctions were made between those with high deficiencies and those who, with less assistance, could be placed in jobs.

This strategy is being piloted in several SDAs using the existing CASAS (rather than the customized version still in development). Initial assessment results support the assumption about JTPA that some employable people are entering the system and are getting services they don't really need. Instead of assisting those employable clients in job search activities, time and money are being spent to put them through the same program available to those who are pre-employable or nearly employable. Employables are those who tested at 225 or above on CASAS, indicating the ability to begin preparation for the GED or other educational equivalent. It is important to note that the reverse is also proving true—that nearly employable and pre-employable people are entering the system and getting services most appropriate for the employable. Until the three tiered model was put into place, SDAs were not making the discrete distinctions implied by the tiered system. The competencies set forth by CRD in this demonstration are helping PICs and SDAs make the distinctions needed to direct clients to those services designed for each tier.

Until this point, clients were either employable or not, and no discrete distinctions were made between those with high deficiencies and those who, with less assistance, could be placed in jobs. The PICs and SDAs involved in this project are exerting a lot of energy by putting a three tiered assessment system into place. It is somewhat surprising that the JTPA system is only now at this point, because the concept of matching needs to services has long been recognized by employment and training programs. However, effective strategies to assess basic skills have been missing.

The commitment is strong, but until now the appropriate tools have not been available to assist service providers in

It now appears that the end result of the project will be the development of 3 or 4 criterion-referenced assessment systems that SDAs across the country can choose from based on the needs of their local labor market.

matching needs to services. With the creation and availability of this methodology, SDAs are much more willing to make the policy and program changes this kind of system requires.

It now appears that the end result of the Project of the States will be the development of three or four criterion-referenced assessment systems that SDAs across the country can choose from based on the needs of their local labor markets. It will no longer be necessary to develop a specific set of tests for each state. Most SDAs and PICs will be able to choose from a set of systems which account for the subtle distinctions across the regions. The needs of the local labor market will serve as the basis for choosing a specific competency. If the JTPA system as a whole uses a limited number of criterion-based reference tests, nationally aggregated data at the national level will be more comprehensive and meaningful, and services will be improved. In summary, the four goals of the Project of the States are: 1) to develop criterion-referenced basic skills assessment tools and a curriculum management system using the criteria of the workplace; 2) to restructure the way services are delivered to youth and adults in JTPA service delivery areas; 3) to establish partnerships between employment and training, welfare and education which result in common identifications of employability and common assessment approaches; and, 4) to build and enhance the capacity of state and local staff to provide training and technical assistance.

All evidence indicates that employers consistently rate basic education skills and work maturity as the most essential qualifications to get and maintain a job.

IMPLICATIONS FOR PUBLIC POLICY

Increasingly the job training system is examining who is receiving services and how services are being delivered. As entry level jobs go begging for qualified workers, job training professionals must identify better methods of matching skill deficiencies to service strategies. As public discourse continues, we offer the following preliminary recommendations based on the ongoing work discussed in this paper.

- Establish a common definition of employability based on basic education skills and work maturity deficiency levels, rather than on acquisition of the high school diploma. All evidence indicates that employers consistently rate basic education skills and work maturity as the most essential qualifications to get and maintain a job. Defining employability in these terms will enable states to set training policies for youth.
- Any revisions to eligibility criteria for JTPA while maintaining overall criteria based on economially disadvantaged, must target based on deficiencies in work skills and functional basic academic skills.
- Policy must address the kind of assessment strategies used to assess basic skill deficiencies. The policy should direct the use of criterion-referenced (or competency-based) tools.
- Require that JTPA youth employment competency systems provide a combination of training programs of basic education skills and either pre-employment, work maturity or job specific skills, and thereby ensure that the concept of employment competent includes at least a locally acceptable snapshot of employment related basic skills.
- Consideration of these strategies should be given in the development of assessment strategies under the Economic Dislocation and Worker Adjustment Assistance Act, the

Family Support Act of 1988, and the Carl Perkins Vocational Education Act, at the very least. If these systems utilize criterion-based assessments, a common assessment language related to the workplace could be developed which would foster coordination and possibly the development of statewide employability credentials.

APPENDIX A

Comprehensive Adult Student Assessment System
Research Report 89-01

Psychometric Background and Measurement Issues Related to the Development of CASAS

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BACKGROUND

The theoretical model underlying the development of the Comprehensive Adult Student Assessment System (CASAS) is Item Response Theory. This measurement model specifies the relationship between observable examinee test performance and the unobservable trait or ability assumed to underlie performance on the test in terms of a mathematical function. The basic assumption of the model is that the probability of success on an item depends only on certain item parameters and an examinee's ability.

The primary advantages of IRT over traditional psychometric procedures are: (1) given a large pool of items all measuring the same trait, an examinee's ability estimate is independent of the sample of items used to derive that estimate; (2) given a large population of examinees, an item's difficulty estimate is independent of the sample of examinees used to derive that estimate; and (3) a statistic is provided for each examinee indicating the precision of the ability estimate.

The specific item response model selected to analyze examinee response data in order to develop CASAS was the one parameter model. This model considers only an item's difficulty in terms of expressing the probability of a correct response at a given ability level. The model is expressed by:

$$P(Xvi|Bv\delta i) = \exp [Xvi(Bv - \delta i)]/[1 + \exp(Br - \delta i)]$$

Where Xvi = 1 for a correct response and 0 for an incorrect response. In this equation, P(Bv) is the probability that an examinee with ability B responds correctly to an item with difficulty δ. The item difficulty parameter δ is on the same scale as examinee ability and is defined as the point where examinees who possess that amount of ability have a 50 percent chance of correctly answering an item of that difficulty.

The Comprehensive Adult Student Assessment System is based on the concept of item banking. Item banks consist of large numbers of content valid and technically sound items which are matched to competency statements, objectives, skills, or tasks. Item banks containing items which are described in terms of item response model parameter estimates provide the following: (1) test developers can easily build tests to measure competency statements or objectives of interest; (2) test developers can produce tests with the desired number of test items per objective; and (3) test quality will usually be better than test developers could produce if they were to prepare the test items themselves (Hambleton and Swaminathan, 1985).

The central idea in building and maintaining an item bank is to place all the items onto a common scale. This process is referred to as calibration and involves computing an estimate of the desired items' parameters, in the case of the one parameter model, the item difficulty. If all examinees respond to all items, an item bank exists subsequent to the computation of the item difficulty estimates. However, establishing an item bank usually requires more items than can be given in one test form or than a single examinee can be realistically expected to answer. The solution to this problem requires the development of multiple sets of items referred to as item field test calibration forms. Each form contains a number of items drawn from the initial pool of items. Depending on the design of the item bank and the assessment purpose it is to serve, the forms may be randomly developed or composed of items of a similar subjective a-priori difficulty. The latter case would result when the desired item bank is expected to measure a wide range of ability rather than a discrete point.

Following the construction of the calibration forms and their administration to a sample of examinees, each form is cali-

brated separately; that is, the item difficulties are determined. In order to place all items on a single scale, a set of common items must exist between any two forms. These items are referred to as linking items. The difference in the two estimates of the common items' difficulties is used to adjust the difficulties of one of the sets of unique items. This process is repeated until all items within all forms have been placed on the common scale.

Throughout the process, items are subjected to a series of checks to determine their fit to the theoretical mode. If the degree of misfit exceeds what could be expected by chance, the item is discarded. The first check occurs during the initial form calibration process where both the "Between Score Group" and "Total" fit statistics are computed. The between score group analysis automatically divides the sample by ability and explicitly asks if the empirically obtained item characteristic curve approximates the required shape. If it does, then the ability groups agree on the item's difficulty and the item is retained.

The second check occurs through the use of the total fit statistic. This statistic identifies any other factors which might influence model-data fit. At this point, an item is again either retained or discarded.

A third check occurs through the use of the point-biserial coefficient. This coefficient identifies items which may be violating the model's assumption of unidimensionality. Again, items are either retained or discarded.

The addition of items to an existing item bank requires a similar process in that calibration forms are developed containing both bank items with known difficulties and the new items. Following the within-form calibration, the difference between the two sets of difficulties for the common or linking items is used to adjust the new items' difficulties in order to put them on the same common scale. As in the initial calibration process, the new items are exposed to the same series of checks with respect to model-data fit.

THE DEVELOPMENT OF THE CASAS ITEM BANK

The process outlined above was followed explicitly in the development of the CASAS Item Bank. Beginning with the

initial item development and continuing into the present, research associated with the project has proved to be exemplary as evidenced by the papers presented at national conferences and the number of agencies adopting the system including review and acceptance by the Joint Dissemination Review Panel (JDRP, U.S. Department of Education) and inclusion in the National Diffusion Network as an exemplary Adult Assessment System.

INITIAL ITEM DEVELOPMENT

The initial pool of items was developed by field personnel considered as experts in adult basic education. All items were matched to specific competency statements/objectives within the life skill areas of Consumer Economics, Community Resources, Health, Occupational Knowledge, and Government and Law. Prior to the initial calibration process, each item was subjected to a review with respect to its content validity and psychometric properties. Items demonstrating obvious flaws with respect to their wording, or content validity were discarded as were items which might be responded to differently by various ethnic groups.

CALIBRATION PROCESS

The initial pool of 350 items was constructed into 10 item field test calibration forms and administered to adult basic education and English as a Second Language (ESL) students in California. Forms were ordered by difficulty with the easiest items being administered to beginning adult basic education and ESL students and the hardest to the more advanced ESL and GED students. Each form was administered to a minimum of 300 examinees in order to insure an adequate number of useable responses. Following each within-form calibration, items failing to meet established criteria were discarded and the form recalibrated prior to bank linking. The initial bank was established in 1981 with a total of 300 items. Since that time, the bank has been expanded to over 4,000 items following the procedures outlined above.

RESEARCH ACTIVITIES

Papers describing research conducted relative to the developed system have been presented at both the American Educational Research Association's Annual Conferences and The National Council on Measurement in Education's Annual Conferences (Chicago, New Orleans, and San Francisco) along with presentations to the American Association of Adult and Continuing Education, National Correctional Education Association, Commission on Adult Basic Education, National Press Club, and Teachers of English to Speakers of other Languages.